Reg. No…………………………………………….   Name……………………………………………   **20U236**

B. Sc. DEGREE END SEMESTER EXAMINATION – MARCH 2020

SEMESTER **– 2 : STATISTICS FOR MATHEMATICS AND COMPUTER APPLICATIONS**

COURSE: **15U2CPSTA2-15U2CRCST2: PROBABILITY AND STATISTICS**

(For Regular - 2019 Admission)

Time: Three Hours   Maximum Marks: 75

Use of Scientific calculators and Statistical tables permitted

PART A

Answer any ten questions. Each question carries 1 mark.

1. Define sample space.
2. What do you mean by compound events?
3. If A is any event and S is the sample space then find P(A|S).
4. Define a discrete random variable with the help of an example.
5. Specify the domain and range of the probability density function of a continuous random variable.
6. Find the distribution of $Y=X^2$ if X follows U(-1,1).
7. Define survival function in reliability theory.
8. What do you mean by coefficient of determination?
9. Define multiple correlation coefficients.
10. Given that 14x + 12y -3 = 0 and 12x + 21y + 10 = 0 are the regression lines, identify the Y on X regression line.
11. Define partial correlation coefficient.
12. What is rank correlation coefficient?   (1 × 10 = 10)

PART B

Each question carries 3 marks. Maximum marks from this part is 15

13. Use the axioms of probability to show that P(A) ≤ P(B) whenever A is a subset of B.
14. Three unbiased dice are thrown. What is the probability that the sum of the numbers thrown is 10.
15. Find the value of k if f(x; y) = kxy; 0 < x < y < 1 and 0 elsewhere is a pdf of a continuous random variable.
16. The p.d.f. of a r.v. X is given by $f(x) = (1/\sqrt{2\pi})e^{-(x^2/2)}$ for $-\infty < x < \infty$ Find the p.d.f. of Y = 2X.
17. The joint pdf of a pair of random variables (X,Y) is given by f(x,y)=(x+2y)/18 , (x,y)=(1,1), (1,2), (2,1), (2,2). Examine whether X, Y are independent.
18. Given the two regression lines 4y = 9x+15 and 25x = 6y +7, find the correlation coefficient.
19. Distinguish between correlation and regression.   (3 × 5 = 15)

PART C

Each question carries 5 marks. Maximum marks from this part is 20

20. Using the frequency definition of probability show that (a) $0 \leq P(A) \leq 1$ (b) $P(A^c) = 1 - P(A)$ (c) $P(A \cup B) = P(A) + P(B)$, when $A B = \Phi$.
21. If A1, A2, A3 are mutually exclusive and exhaustive events show that B1 = A1, B2 = Ā1 A2 and B3 = Ā 1Ā2A3 are mutually exclusive and exhaustive.
22. The joint p.d.f of two random variables X and Y is $f(x; y) = 2$; $0 < x < y < 1$ and 0 elsewhere. Are X and Y independent?
23. Let the joint pdf of (X,Y) be $f(x; y) = (x+y)/21$; $x = 1, 2, 3$; $y = 1, 2$ find the marginal pdfs of X and Y. Find the conditional density of X given Y=2.
24. Find the distribution function of the r.v with p.d.f. $f(x) =0$ for $x<-2$, $(x+2)/8$ for $-2 \leq x < 0$, ½ for $0 \leq x < 1$, $1/(4x^2)$ for $x \geq 1$.
25. Describe the properties of bivariate regression coefficients. (5 × 4 = 20)

PART D

Each question carries 10 marks. Maximum marks from this part is 30

26. State and prove Baye's theorem.
27. A random variable X has the following density function $f(x) = ax$ if $0<x<1$, a if $1<x<2$, $-ax+3a$ if $2<x<3$ and 0 elsewhere. (i) Determine the constant a (ii) Determine the distribution function (iii) calculate $P(1< X\leq 1.5)$.
28. Derive the formula for Spearman's rank correlation.
29. Calculate (i) Karl Pearson's coefficient of correlation and (ii) the two regression lines from the following data.

X	65	66	67	67	68	69	71	73
Y	17	18	14	18	22	20	19	20

(10 × 3 = 30)

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